

polishing regions may be disposed on a circular polishing pad as concentric annular regions. In a further example, the polishing regions may be disposed as parallel linear regions on a linear pad (e.g., a belt). By arranging these regions of distinct polishing characteristics such that a wafer may be selectively polished by only one region when it is selectively placed in contact with that portion of a polishing pad, enables methods wherein the amount of time of polishing with those regions of distinct polishing characteristics may be controlled to achieve a desired polishing result. In other words, the structure of the polishing pads in accordance with the present invention permits a wafer to remain in contact with a region having a single, distinct, polishing characteristic even though the pad is in motion and travels through one or more complete rotations in the case of a circular pad, or through one or more complete loops in the case of a linear pad.

Polishing pads, configured in accordance with the present invention, may have a uniform top layer with distinct underlying regions which impart the different, distinct polishing characteristics to the polishing regions. Alternatively, such polishing pads may have a uniform underlayer with a top layer having distinct regions of hardness, surface texture, or any other attribute that affects polishing characteristics.

Claims 22-35 are drawn to Applicants' invention of polishing pads suitable for chemical mechanical polishing of wafers where those pads have two or more regions, each of those regions has a different polishing characteristic, and where the wafer may be selectively placed in frictional contact with any particular region of the polishing pad for a predetermined continuous amount of time regardless of the motion of the pad. In other words, a wafer to be polished can be placed on a region of the polishing pad having a certain polishing characteristic, and, regardless of whether the pad moves radially (e.g., as with a circular pad) or linearly (e.g., as with a belt), the wafer can remain in the region having the selected polishing characteristic until it (i.e., the wafer) is moved, typically under control of the polishing machine, to another region having a different polishing characteristic.

Rejections under 35 USC 102(b)

Claims 22 and 26-28 have been rejected under 35 USC 102(b) as being anticipated by Glover (US Patent 959,054) or Neff (US Patent 5,578,099).

For at least the reasons set forth below, Applicants respectfully traverse the rejections of Claims 22 and 26-28 under 35 USC 102(b), and request that they be withdrawn.

First, Glover does not disclose the claimed limitation of each polishing region having **distinct polishing characteristics** [emphasis added]. In fact, Glover states at col. 1, lines 13-16, that an object of the invention is to provide a prepared disk in which the abrasive material is applied to one side face and is **graded** [emphasis added] from the center outwardly; and further states at col. 2, lines 60-65 that the grinding and polishing means comprises abrasive material applied to one surface of a disk, with the abrasive **being of different degrees of fineness varying gradually and uniformly from the center to the outer edge of the disk in all directions** [emphasis added]. In other words, Glover does not disclose the regions of distinct polishing characteristics recited in Applicants' Claims, and therefore those Claims cannot be anticipated by Glover.

Second, Neff does not teach the claimed limitations of at least two polishing regions having distinct polishing characteristics, and wherein the at least two polishing regions are disposed on the polishing pad as concentric annular regions. Applicants' Claimed structure results from satisfying the constraints imposed by its intended use. That is, the structure of the polishing pads in accordance with the present invention permits a wafer to remain in contact with a region having a single, distinct, polishing characteristic, even though the pad is in motion and travels through one or more complete rotations in the case of a circular pad, or through one or more complete loops in the case of a linear pad. Since such a structure is not shown by Neff, and no motivation for such a structure is provided, Applicants' Claims cannot be anticipated by Neff.

Applicants respectfully request withdrawal of the rejections of Claims 22, and 26-28 under 35 USC 102(b).

Rejections under 35 USC 103(a)

Claims 29-30 and 34-35 have been rejected under 35 USC 103(a) as being unpatentable over Glover (US Patent 959,054) of Neff (US Patent 5,578,099). The Examiner states that neither Glover or Neff disclose the pad being linear. The Examiner further states that it would have been obvious to have used the teachings of either Glover or Neff on a linear pad.

For at least the reasons set forth below, Applicants respectfully traverse the rejections of Claims 29-30 and 34-35 under 35 USC 103(a) and request that they be withdrawn.

First, Glover does not disclose the claimed limitation of each polishing region having **distinct polishing characteristics** [emphasis added]. In fact, Glover states at col. 1, lines 13-16, that an object of the invention is to provide a prepared disk in which the abrasive material is applied to one side face and is **graded** [emphasis added] from the center outwardly; and further states at col. 2, lines 60-65 that the grinding and polishing means comprises abrasive material applied to one surface of a disk, with the abrasive **being of different degrees of fineness varying gradually and uniformly from the center to the outer edge of the disk in all directions** [emphasis added]. In other words, Glover does not disclose the regions of distinct polishing characteristics recited in Applicants' Claims, and therefore those Claims cannot be cannot be obvious in view of Glover and the Examiner's Official Notice of the existence of linear pads in the abrasive tool art.

Second, Neff does not teach the claimed limitations of at least two polishing regions having distinct polishing characteristics, and wherein the at least two polishing regions are disposed on the polishing pad as concentric annular regions. Applicants' Claimed structure results from satisfying the constraints imposed by its intended use. That is, the structure of the polishing pads in accordance with the present invention

permits a wafer to remain in contact with a region having a single, distinct, polishing characteristic, even though the pad is in motion and travels through one or more complete rotations in the case of a circular pad, or through one or more complete loops in the case of a linear pad. Since such a structure is not shown by Neff, and no motivation for such a structure is provided, Applicants' Claims cannot be obvious in view of Neff and the Examiner's Official Notice of the existence of linear pads in the abrasive tool art.

Additionally, notwithstanding the Examiner's taking Official Notice that the use of linear pads is old and well known, Applicants respectfully submit that knowledge of the linear pad format alone is no motivation for producing the polishing pad defined by Applicants' Claims. Neither does there appear to be a suggestion in the references of record for making the claimed pads having parallel linear regions, each region having distinct polishing characteristics.

Claims 23-25 and 31-32 have been rejected under 35 USC 103(a) as being unpatentable over Glover (US Patent 959,054) of Neff (US Patent 5,578,099) in view of Cote, et al., (US Patent 5,534,106). The Examiner alleges that Glover or Neff disclose the claimed pad but do not disclose that the base layer comprises at least two regions disposed to underlie one of at least two polishing regions and that the base layer regions have different hardness or thickness.

For at least the reasons set forth below, Applicants respectfully traverse the rejection Claims 23-25 and 31-32 under 35 USC 103(a), and request that they be withdrawn.

First, Applicants disagree with the Examiner's allegation that either Glover or Neff disclose the polishing pad defined by Applicants' Claims. As discussed in detail above, neither Glover, nor Neff, disclose the regions of distinct polishing characteristics disposed either as concentric annular regions on circular pads, or as parallel linear regions on belt-style pads, as recited in the Claims.

Second, Cote, et al., disclose chemical mechanical polishing of wafers using a polishing pad that has two or more regions of different polishing characteristics. The regions of the pads shown and described by Cote, et al., are arranged as wedges, or alternatively as half circles, such that a wafer is exposed to each of the regions during each rotation of the pad. See, for example, column 6, lines 54-59, where it is stated: "Since both pad **202** and wafer are rotating, the wafer undergoes alternating abrasion and polishing. This cycle is continuously repeated with each rotation of pad **202**, to provide continuous application of alternating abrasion and polishing to the wafer." The invention defined by Applicants' Claims require that the regions of different polishing characteristics be disposed either as concentric annular regions for circular pads, or as parallel linear regions for polishing pads that are configured as linear belts. This is in contradistinction to Cote, et al., which teaches pad configurations designed to continuously expose the wafer to the different polishing regions with each rotation of the polishing pad (which is equivalent to each loop of a linear or belt-style pad). Cote, et al., teach away from Applicants' invention.

Since the combination of Glover or Neff with Cote, et al., does not produce the Claimed invention, the rejections under 35 USC 103(a) should be withdrawn.

Conclusion

All of the rejections of the Office Action of September 25, 2002, have been responded to herein, and Applicants submit that the pending Claims 22-35 are now in condition for allowance.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

By 

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